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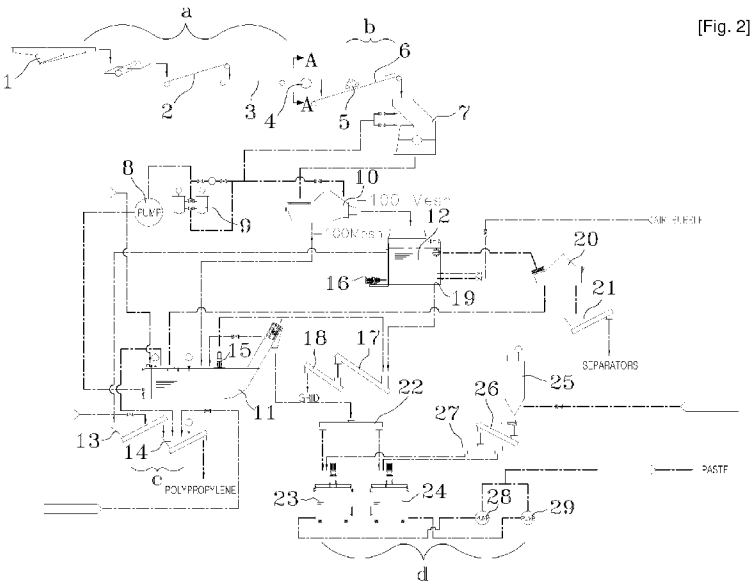
(54) **Title:** SCRAP BATTERY RECYCLING PLANT

[Fig. 2]



(57) **Abstract:** Disclosed therein is a scrapped battery recycling system, which can continuously crush scrapped batteries and sort and separate polypropylene materials made of plastic, such as a grid including an electrode terminal and polar plates, an upper cover, an electroplating tank, an indicator and a handle, an electrolyte, lead, and lead peroxide depending on a degree of importance using paste produced by kneading dilute sulphuric acid to realize automatization of processes, thereby greatly reducing manpower in comparison with the prior art, enhancing productivity by improving working environments, preventing the environmental pollution by securing the pure technology to recycle scrapped materials, and securing an economical efficiency by providing high value-added by-products.

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Description

SCRAP BATTERY RECYCLING PLANT

Technical Field

[1] The present invention relates to a scrapped battery recycling system for sorting and separating various constituents from scrapped batteries, which become exhausted, after crushing the scrapped batteries, and more particularly, to a scrapped battery recycling system, which can realize automatization in a continuous recycling of scrapped batteries, thereby improving working environments, reducing environmental pollution, and securing an economical efficiency by providing high value-added by-products.

Background Art

[2] In general, a lead storage battery is used as a power source for supplying power to operate electronic components of a vehicle. Such a lead storage battery discharges electricity by converting chemical energy into electric energy, and is charged with electricity by converting electric energy, which is supplied from another power source, into chemical energy and storing the converted chemical energy.

[3] Such a lead storage battery is scrapped not to cause environmental pollution if it becomes exhausted, and the constituents of the scrapped lead storage battery are reclaimed in view of the surrounding environment.

[4] Particularly, recently, as people are very interested in clean technology to recycle resources, there is a need for the scrapping work of the lead storage batteries, which is increased sharply.

[5] FIG. 1 is a perspective view of a typical battery. It will be described in brief. First, a case 110 forming the outer body of the battery includes: an electroplating tank 113 of a container type; and a cover 111 for shielding an opened upper face of the electroplating tank 113, the cover 111 having a handle 115 mounted thereon and an electrode terminal 130 exposedly protruded from the top face thereof. The case 110 is molded with a plastic material.

[6] A number of polar plates 150 are integrally disposed inside the case 110 through a scrap 170, and in this instance, each of thepolar plates 150 has a substrate and an active material. In addition, the lead storage battery contains a great deal of lead and sulphuric acid.

[7] However, since a conventional method of scrapping batteries has several problems in that it takes much time to progress the scrapping process since workers have to destruct, separate and scrap the batteries manually, and in that operation efficiency lowers since it is impossible to progress operations continuously. Particularly, the conventional method of scrapping batteries has another problem in that serious problems

may be caused if there is an error in working since the scrapped battery includes not only harmful components having serious and adverse influences on a human body but also components arousing the environmental pollution.

Disclosure of Invention

Technical Problem

[8] Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior arts, and it is an object of the present invention to provide a scrapped battery recycling system, which can continuously crush scrapped batteries and sort and separate polypropylene materials madeof a plastic material, such as a grid including an electrode terminal and polar plates, an upper cover, an electroplating tank, an indicator and a handle, an electrolyte, lead, and lead peroxide dependingon a degree of importance using paste produced by kneading dilute sulphuric acid to realize automatization of processes, thereby improving working efficiency.

Technical Solution

[9] To achieve the above objects, according to the present invention, there is provided a scrapped battery recycling system comprising: an electrolyte removing part for continuously conveying supplied scrapped batteries to a cutter mountedat a side thereof and removing electrolytes, which are contained in the scrapped batteries; an iron-separating part mounted at a side of the electrolyte removing part for removing irons from the supplied scrapped batteries, from whichthe electrolytes areremoved, using an iron-separator mounted at a side thereof; a crusher mounted at a side of the iron-separating part for crushing the supplied scrapped batteries, from which the iron materials are removed; a first vibration screen mounted at a side of the crusher for sorting and separating the crushed materials supplied thereto from the crusher according to a size of 100 mesh and distributing the sorted and separated materials; a drag chain conveyer mounted at a side of the first vibration screen for accumulating paste, which is the crushed material of less than 100 mesh supplied thereto from the first vibration screen, in the form of a sludge; a hydroseparator mounted at the other side of the crusher for receiving scraps, which are the crushed materials of more than 100 mesh, from the crusher, supplying polypropylene, whichfloats on the water, to a recovering means mounted at a side thereof, and jetting air while conveying separators and grids, which are submerged in the water, to an outlet through a first screw conveyer mounted in the lower portion thereof to thereby separately supply the separators and heavy plastic, which float on the water by air bubbles; a second vibration screen mounted at a side of the hydroseparator for receiving the separators and heavy plastic from the hydroseparator, supplying water and the residual paste contained in the separators to the drag chain conveyer and recovering the separators

through a screw conveyer mounted at a side thereof; and an agitating means mounted at a side of the drag chain conveyer for agitating the paste supplied thereto from the second vibration screen together with sodium carbonate being supplied when the agitating means is filled with the paste of a fixed amount and passing desulfurized materials through a filter.

[10] According to the aspect of the present invention, there is provided a scrapped batte ry recycling system including: wherein the electrolyte removing part includes: a vibration feeder for horizontally conveying the supplied batteries to a side using a circulation belt while applying vibration; a first inclined belt conveyer aligned at an end of a side of the vibration feeder for upwardly conveying the supplied batteries to a side; and a flat belt conveyer aligned at an end of a side of the first inclined belt conveyer for horizontally conveying the batteries, the flat belt conveyer having a cutter exposedly mounted on a conveying path of the scrapped batteries and rotated by a driving source.

[11] According to the aspect of the present invention, there is provided a scrapped battery recycling system including: wherein theiron-separating part includes: a second inclined belt conveyer mounted at a side of the electrolyte removing part for inclinedly conveying the supplied batteries in the upward direction;and an iron-separator mounted at a side of the upper portion of the second inclined belt conveyer and having a magnet for separating irons from the scrapped batteries conveyed from the second inclined belt conveyer.

[12] According to the aspect of the present invention, there is provided a scrapped battery recycling system including: wherein the first vibration screen has a mesh net having a vibration generating source mounted at a side thereof.

[13] According to the aspect of the present invention, there is provided a scrapped battery recycling system including: wherein the drag chain conveyer is filled with water of a fixed amount and has a first pump mounted at a side thereof, so that water is distributed to the hydroseparator and the paste of the sludge type accumulated on the bottom thereof is supplied to an agitator.

[14] According to the aspect of the present invention, there is provided a scrapped battery recycling system including: wherein the recovering means includes: a second screw conveyer for washing the supplied polypropylene with wash water while upwardly conveying the supplied polypropylene to a side; and a third screw convey-ermounted at a side of the second screw conveyer for guiding the supplied polypropylene to a recovery location by upwardly conveying the supplied polypropylene to a side.

[15] According to the aspect of the present invention, there is provided a scrapped battery recycling system including: wherein the second vibration screen has a mesh net

having a vibration generating source mounted at a side thereof.

[16] According to the aspect of the present invention, there is provided a scrapped battery recycling system including: wherein the agitating means includes: a first forward and backward screw conveyer for distributing and supplying the paste supplied thereto from the drag chain conveyer; a silo for storing sodium carbonate and conveying the stored sodium carbonate to the outside by a fourth screw conveyer mounted at a side thereof; a second forward and backward screw conveyer for distributing and supplying the sodium carbonate conveyed from the fourth screw conveyer; first and second agitators for agitating the paste and sodium carbonate supplied thereto from the first forward and backward screw conveyer and the second forward and backward screw conveyer; and second and third pumps for pumping a desulfurized reactant from the first and second agitators and supplying it to a filter press.

Advantageous Effects

[17] According to the present invention, the scrapped battery recycling system can considerably reduce manpower in comparison with the prior arts since the scrapping process of the scrapped batteries can be carried out continuously and automatically, enhance productivity by improving working environments, prevent the environmental pollution by securing the pure technology to recycle scrapped materials, and secure an economical efficiency by providing high value-added by-products.

Brief Description of the Drawings

[18] FIG. 1 is a perspective view of a general scrapped battery.

[19] FIG. 2 is a schematic diagram of a scrapped battery recycling system according to the present invention.

[20] FIG. 3 is a sectional view taken along the line of A-A of FIG. 2.

[21] <Explanation of essential reference numerals in drawings>

[22] 1: vibration feeder 2: first inclined belt conveyer

[23] 3: flat belt conveyer 4: cutter

[24] 5: iron-separator 6: inclined belt conveyer

[25] 7: crusher 8: pump

[26] 9: filter 10: first vibration screen

[27] 11: drag chain conveyer 12: hydroseparator

[28] 13: second screw conveyer

[29] 14: third screw conveyer

[30] 15: first pump 16: first screw conveyer

[31] 17: fifth screw conveyer 18: sixth screw conveyer

[32] 19: outlet 20: second vibration screen

[33] 21: seventh screw conveyer

[34] 22: first forward and backward screw conveyer

[35] 23,24: first and second agitators

[36] 25: silo 26: fourth screw conveyer

[37] 27: second forward and backward screw conveyer

[38] 28,29: second and third pumps

[39] 30: filter press a: electrolyte-removing part

[40] b: iron-separating part c: recovering means

[41] d: agitating means

Mode for the Invention

[42] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention in conjunction with the accompanying drawings. Termsand words used in the detailed description and claims of the present invention shall be interpreted as meanings and concepts corresponding to the technical idea of the present invention on the basis of a principal that an inventor can properly define concepts of words to describe his or her invention in the best ways.

[43] Reference will be now made in detail to the preferred embodiment of the present invention with reference to the attached drawings.

[44] FIG. 2 is a schematic diagram for explaining a configurationof a scrapped battery recycling system according to the present invention, and FIG. 3 is a sectional view taken along the line of A-A of FIG. 2.

[45] As shown in the drawings, the scrapped battery recycling system according to the present invention is a plant to remove electrolytes from scrapped batteries (r) continuously fed therein, crush the scrapped batteries (r), and automatically sort and separate polypropylene, paste and metallic materials from the crushed batteries, and includes: an electrolyte removingpart (a) for feeding the scrapped batteries (r) into the recycling plant and removing the electrolytes, which are contained in the scrapped batteries; an iron-separating part (b) for separating and collecting irons contained in the scrapped batteries (r)a crusher 7 for crushing the scrapped batteries (r); a first vibration screen 10 for sorting crushed materials of the batteries (r) according to a predetermined size; a drag chain conveyer 11 for separating paste, in which the sorted crushed materials of the predetermined size are kneaded; a hydroseparator 12 for resorting and reseparating the sorted crushed materials using specific gravity; a second vibration screen 20 for separating the paste and separators from the sorted crushed materials after receiving the separators and heavy plastic of the sorted crushed materials from the hydroseparator 12; and an agitating means (d) for desulfurizing the paste supplied

thereto fromthe second vibration screen 20.

[46] The electrolyte removing part (a) may use a conventional conveyer system to continuously receive the scrapped batteries (r), and carries out a process to remove the electrolytes contained inside the scrapped batteries (r) while the scrapped batteries (r) pass through a cutter (4).

[47] The electrolyte removing part (a) includes: a vibration feeder 1 for horizontally conveying the scrapped batteries (r) to a side while applying vibration; a first inclined belt conveyer 2 aligned at an end of a side of the vibration feeder 1 for continuously conveying the suppliedbatteries (r) in the upward direction to the side; and a flat belt conveyer 3 aligned at an end of a side of the first inclined belt conveyer 2 for continuously conveying the supplied batteries (r) in a horizontal direction, the flat belt conveyer 3 having a cutter 4 exposedly mounted on a conveying path of the scrapped batteries (r) and rotated by a driving source.

[48] Here, an extracting rotor may be selectively mounted between the end of the side of the vibration feeder 1 and the first inclined belt conveyer 2. The extracting rotor is to move the scrapped batteries of a proper quantity toward the first inclined belt conveyer 2 through the vibration feeder 1 by properly regulating the movement quantity of the scrapped batteries. A detailed description of the extracting rotor will be omitted since it can come into effect by the previously known technology.

[49] Meanwhile, the cutter 4 is a device to partially crush the scrapped batteries (r) so that the electrolytes contained in the scrapped batteries (r) flow out, and can come into effect by the previous known technologies.

[50] FIG. 3 illustrates the configuration of the cutter 4 of the electrolyte removing part (a) according to the present invention. That is, the cutter 4 includes a number of disc type saw-blades (s) rotatably mounted and aligned at predetermined intervals; a slave pulley 4'mounted at an end of a shaft, which connects the disc type saw-blades (s) with one another; a motor (m) receiving electricity from a side and rotating in one direction; a driving pulley (m') integrally coupled on a rotary shaft of the motor (m); and a belt (v) for connecting the driving pulley (m') and the slave pulley 4' witheach other, whereby the disc type saw-blades (s) are rotated by a rotational force of the motor (m). In this instance, as shown in the drawing, the disc type saw-blades (s) cut the lower portion of each scrapped battery (r) conveyed in a state where it is loaded on the upper surface of a conveyer belt of the flat belt conveyer 3.

[51] It is preferable that the vibration feeder 1 having the cutter 4 further includes a variable frequency driver, which is previously known, to feed and convey the scrapped batteries (r) uniformly.

[52] The iron-separating part (b) is located on a side of the electrolyte removing part (a) insuch a way as to continuously receive the scrapped batteries (r), from which the

electrolytes are removed, and convey them to a side. That is, the iron-separating part (b) is to prevent irons attached on the scrapped batteries (r) from entering the crusher 7, which will be described later, by removing the irons from the scrapped batteries (r) supplied thereto from the electrolyte removing part (a).

[53] As shown in the drawings, the iron-separating part (b) includes: a second inclined belt conveyer 6 mounted at a side of the electrolyte removing part (a) for inclinedly conveying the supplied batteries (r) in the upward direction; and an iron-separator 5 mounted at a side of the upper portion of the second inclined belt conveyer 6 and having a magnet of high magnetic force (not shown) to separate irons from the scrapped batteries (r) conveyed from the second inclined belt conveyer 6. Here, a detailed description of the iron-separator 5 will be omitted since it can come into effect by the previously known technology.

[54] The crusher 7 is mounted at a side of the iron-separating part (b), namely, at a side of the iron-separator 5, and crushes the scrapped batteries (r), from which the electrolytes and irons are removed, supplied thereto from the iron-separator 5. Thecrusher 7 repeatedly strikes the scrapped batteries (r) introduced into the crusher 7 at a high speed so as to crush them into a predetermined size. A detailed description related with the configuration and operation of the crusher 7 will be omitted since it can come into effect by the previously known technology.

[55] The first vibration screen 10 is mounted at a side of the crusher 7 to sort the crushed materials supplied thereto from the crusher 7 by the predetermined size, and in this instance, the sorted size is about 100 mesh.

[56] That is, the first vibration screen 10 includes a mesh net (not shown) having a size of about 100 mesh, and a vibration generating source (not shown) for moving the mesh net horizontally or vertically. Here, a detailed description of the first vibration screen 10 will be omitted since it can come into effect by the previously known technology.

[57] The first vibration screen 10 supplies the crushed materials of less than 100 mesh to the drag chain conveyer 11, which will be described later, but supplies the crushed materials of more than 100 mesh to the hydroseparator 12.

[58] The drag chain conveyer 11 is mounted at a side of the first vibration screen 10 is to receive and accumulate the crushed materials of less than 100 mesh, namely, the paste. The drag chain conveyer 11 is filled with water of a fixed amount, and so, accumulate the crushed materials in a kneaded state, namely, a sludge type, and a first pump 15 mounted at a side of the drag chain conveyer 11 forcedly sends water contained in the drag chain conveyer 11 to the crusher 7 and the first vibration screen 10.

[59] The sludge type paste accumulated on the bottom of the drag chain conveyer 11 is supplied to agitators 23 and 24, which will be described later.

[60] The hydroseparator 12 is mounted at the other side of the crusher 7, and separates

polypropylene, separators and grids from the scraps, which are the crushed materials of more than 100 mesh, using specific gravity.

[61] That is, the hydroseparator 12 supplies the relatively light polypropylene, which floats on the water, out of the crushed materials of more than 100 mesh supplied thereto from the crusher 7 to a recovering means (c) mounted at a side thereof, and jets air while forcedly sending the relatively heavy separators and grids, which are submerged in the water, to an outlet 19 through a first screw conveyer 16 mounted on the lower portion therein and moves the separators and heavy plastic, which float on the water by air bubbles, to a side thereof.

[62] Here, the recovering means (c) includes: a second screw conveyer 13 for washing the supplied polypropylene with wash water while upwardly conveying the supplied polypropylene; and a third screw conveyer 14 arranged at a side of the second screw conveyer 13 in such a way as to be continuously supplied with the washed polypropylene, the third screw conveyer 14 guiding the supplied polypropylene to a recovery location while supplying refill water to the supplied polypropylene.

[63] In brief, the hydroseparator 12 is a device to sort the polypropylene, separators and grids supplied through the first vibration screen 10 using specific gravity, and in this instance, the polypropylene floats on the water since it is relatively light, but the separators and grids are submerged in the water.

[64] The submerged separators and grids are conveyed to the outlet 19 through the second screw conveyer 13, and in this instance, when air is jet toward the outlet 19, the air bubbles are generated, and so, the separators and heavy plastic, which are lighter than the grids, float on the water and are supplied to the second vibration screen 20.

[65] The second vibration screen 20 is mounted at a side of the hydroseparator 12, separates the water and residual paste from the supplied plastic and supplies them to the drag chain conveyer 11, and recovers the separators to the recovery location through a seventh screw conveyer 21.

[66] Here, the second vibration screen 20 includes: a metallic mesh net (not shown) having a scale of a predetermined size like the first vibration screen 10; and avibration generating source (not shown) for moving the mesh net horizontally or vertically. A detailed description of the first vibration screen 10 will be omitted since it can come into effect by the previously known technology.

[67] The agitating means (d) is mounted at a side of the drag chain conveyer 11 to agitate the supplied paste together with sodium carbonate and desulfurize it. The desulfurized reactant passes through a filter.

[68] That is, the agitating means (d)includes: a first forward and backward screw conveyer 22 for distributing and supplying the paste supplied thereto from the drag chain conveyer 11; a silo 25 for storing sodium carbonate of a fixed amount and

discharging the stored sodium carbonate to the outside by a fourth screw conveyer 26; asecond forward and backward screw conveyer 27 for distributing and supplying sodium carbonate conveyed from the silo 25; the first and second agitators 23 and 24 for agitating the paste and sodium carbonate supplied thereto from the first forward and backward screw conveyer 22 and the second forward and backward screw conveyer 27; and second and third pumps 28 and 29 for pumping the desulfurized reactant from the first and second agitators 23 and 24 and supplying it to a filter press (not shown).

[69] Meanwhile, it is preferable that the first and second agitators 23 and 24, the drag chain conveyer 11 and the plural screw conveyers respectively have previously known level sensors to sense the water level. In addition, the first and second agitators 23 and 24 may respectively have temperature sensors.

[70] Furthermore, it is preferable that an input and output terminal such as a computer monitors and controls the above all processes to automatize all of the processes.

[71] An operation of the scrapped battery recycling system according to the present invention will be described as follows.

[72] First, the scrapped batteries (r) are moved to the first inclined belt conveyer 2 through the vibration feeder 1, and then, moved to the flat belt conveyer 3. After that, the electrolytes are removed from the scrapped batteries (r) while passing through the cutter 4.

[73] The scrapped batteries (r), from which the electrolytes are removed, are moved to the second inclined belt conveyer 6. In this instance, irons are removed from the scrapped batteries (r) while the batteries (r) pass through the iron-separator 5, and the scrapped batteries (r) are conveyed to the crusher 7 and crushed.

[74] Here, when the scrapped batteries (r) fed to the crusher 7 are crushed, while a pump 8 is continuously operated, a circulation process that water stored in the drag chain conveyer 1 passes through the filter 9, and is continuously jet to the inside of the crusher 7 and the first vibration screen 10 and recovered to the drag chain conveyer 11 is repeated.

[75] In addition, pressure sensors (not shown) can be mounted on the front and rear ends of the filter 9 to check stopping of a nozzle and the filter, the scraps crushed through the crusher 7 drops to the first vibration screen 10, and water passing through the filter 9 is jet and supplied through the nozzle.

[76] In this instance, the paste, in which the crushed materials of less than 100 mesh are kneaded, is stored in the drag chain conveyer 11 together with the wash water, and the scraps of more than 100 mesh (grid, polypropylene, separator, and so on) are washed and moved to the hydroseparator 12.

[77] Continuously, in the hydroseparator 12, the first pump 15 is actuated to always

supply water of the fixed amount. Here, the polypropylene is sorted and recovered through the second screw conveyer 13 and the third screw conveyer 14, and the separators, grids and heavy plastic are moved toward the outlet 19 by the first screw conveyer 16 located in the lower portion of the hydroseparator 12. In this instance, air is supplied to separate the separators, grids and heavy plastic from one another, and so, the separators and heavy polypropylene, which float on the water by the air bubbles, are moved to the second vibration screen 20.

[78] The second vibration screen 20 separates the water (containing residual paste), separators and heavy plastic from one another, so that the separators are separated and recovered through the seventh screw conveyer 21 and the heavy plastic, which was not sorted in the first vibration screen 10, is recovered through the third screw conveyer 14.

[79] Meanwhile, the greatest heavy grid passes through the outlet 19 of the hydroseparator 12, and then is recovered through fifth and sixth screw conveyers 17 and 18.

[80] In addition, the paste collected in the drag chain conveyer 11 is distributed and stored to the first and second agitators 23 and 24 through the first forward and backward screw conveyer 22. When the first and second agitators 23 and 24 are filled with the paste of the fixed amount, sodium carbonate stored in the silo 25 is distributed to the first and second agitators 23 and 24 by the second forward and backward screw conveyer 27 after passing through the fourth screw conveyer 26.

[81] In this instance, the feeing volume of sodium carbonate is not shown in the drawings, but automatically weighed by load cells respectively attached on the lower portion of the agitators. The sodium carbonate is desulfurized in the first and second agitators 23 and 24, sent to the filter press 30 through the second and third pumps 28 and 29, and after the press, water is sent to a water treatment plant and just the paste is recovered. After pumping is finished, pipes are washed with process water.

[82] While the present invention has been described with reference to the particular illustrative embodiment, it is not to be restricted by the embodiment but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiment without departing from the scope and spirit of the present invention.

Industrial Applicability

[83] As described above, since the scrapped battery recycling system according to the present invention can continuously crush scrapped batteries and sort and separate polypropylene materials made of plastic, such as a grid including an electrode terminal and polar plates, an upper cover, an electroplating tank, an indicator and a handle, an

electrolyte, lead, and lead peroxide depending on a degree of importance using paste produced by kneading dilute sulphuric acid to realize automatization of processes, the scrapped battery recycling system can greatly reduce manpower in comparison with the prior art, enhance productivity by improving working environments, prevent the environmental pollution by securing the pure technology to recycle scrapped materials, and secure an economical efficiency by providing high value-added by-products.

Claims

[1] A scrapped battery recycling system comprising:
an electrolyte removing part for continuously conveying supplied scrapped batteries to a cutter mounted at a side thereof and removing electrolytes, which are contained in the scrapped batteries;
an iron-separating part mounted at a side of the electrolyte removing part for removing irons from the supplied scrapped batteries, from which the electrolytes are removed, using an iron-separator mounted at a side thereof;
a crusher mounted at a side of the iron-separating part for crushing the supplied scrapped batteries, from which the iron materials are removed;
a first vibration screen mounted at a side of the crusher for sorting and separating the crushed materials supplied thereto from the crusher according to a size of 100 mesh and distributing the sorted and separated materials;
a drag chain conveyer mounted at a side of the first vibration screen for accumulating paste, which is the crushed material of less than 100 mesh supplied thereto from the first vibration screen, in the form of a sludge;
a hydroseparator mounted at the other side of the crusher for receiving scraps, which are the crushed materials of more than 100 mesh, from the crusher, supplying polypropylene, whichfloats on the water, to a recovering means mounted at a side thereof, and jetting air while conveying separators and grids, which are submerged in the water, to an outlet through a first screw conveyer mounted in the lower portion thereof to thereby separately supply the separators and heavy plastic, which float on the water by air bubbles;
a second vibration screen mounted at a side of the hydroseparator for receiving the separators and heavy plastic, supplying water and the residual paste contained in the separators to the drag chain conveyer and recovering the separators through a screw conveyer mounted at a side thereof; and
an agitating means mounted at a side of the drag chain conveyer for agitating the paste supplied thereto from the second vibration screen together with sodium carbonate being supplied when the agitating means is filled with the paste of a fixed amount and passing desulfurized materials through a filter.

[2] The scrapped battery recycling system according to claim 1, wherein the electrolyte removing part includes:
a vibration feeder for horizontally conveying the supplied batteries to a side using a circulation belt while applying vibration;
a first inclined belt conveyer aligned at an end of a side of the vibration feeder for upwardly conveying the supplied batteries to a side; and

a flat belt conveyer aligned at an end of a side of the first inclined belt conveyer for horizontally conveying the batteries, the flat belt conveyer having a cutter exposedly mounted on a conveying path of the scrapped batteries and rotated by a driving source.

[3] The scrapped battery recycling system according to claim 1, wherein the iron-separating part includes:
a second inclined belt conveyer mounted at a side of the electrolyte removing part for inclinedly conveying the supplied batteries in the upward direction; and an iron-separator mounted at a side of the upper portion of the second inclined belt conveyer and having a magnet for separating irons from the scrapped batteries conveyed from the second inclined belt conveyer.

[4] The scrapped battery recycling system according to claim 1, wherein the first vibration screen has a mesh net having a vibration generating source mounted at a side thereof.

[5] The scrapped battery recycling system according to claim 1, wherein the drag chain conveyer is filled with water of a fixed amount and has a first pump mounted at a side thereof, so that water is distributed to the hydroseparator and the paste of the sludge type accumulated on the bottom thereof is supplied to an agitator.

[6] The scrapped battery recycling system according to claim 1, wherein the recovering means includes:
a second screw conveyer for washing the supplied polypropylene with wash water while upwardly conveying the supplied polypropylene to a side; and a third screw conveyermounted at a side of the second screw conveyer for guiding the supplied polypropylene to a recovery location by upwardly conveying the supplied polypropylene to a side.

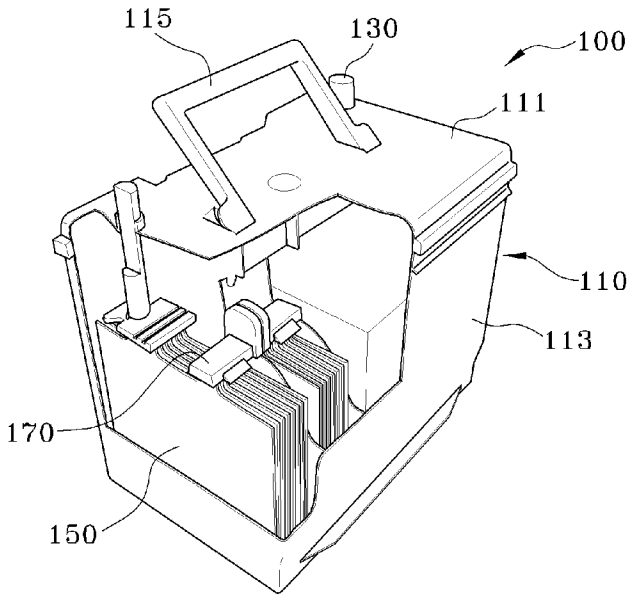
[7] The scrapped battery recycling system according to claim 1, wherein the second vibration screen has a mesh net having a vibration generating source mounted at a side thereof.

[8] The scrapped battery recycling system according to claim 1, wherein the agitating means includes:
a first forward and backward screw conveyer for distributing and supplying the paste supplied thereto from the drag chain conveyer;
a silo for storing sodium carbonate and conveying the stored sodium carbonate to the outside by a fourth screw conveyer mounted at a side thereof;
a second forward and backward screw conveyer for distributing and supplying the sodium carbonate conveyed from the fourth screw conveyer;
first and second agitators for agitating the paste and sodium carbonate supplied

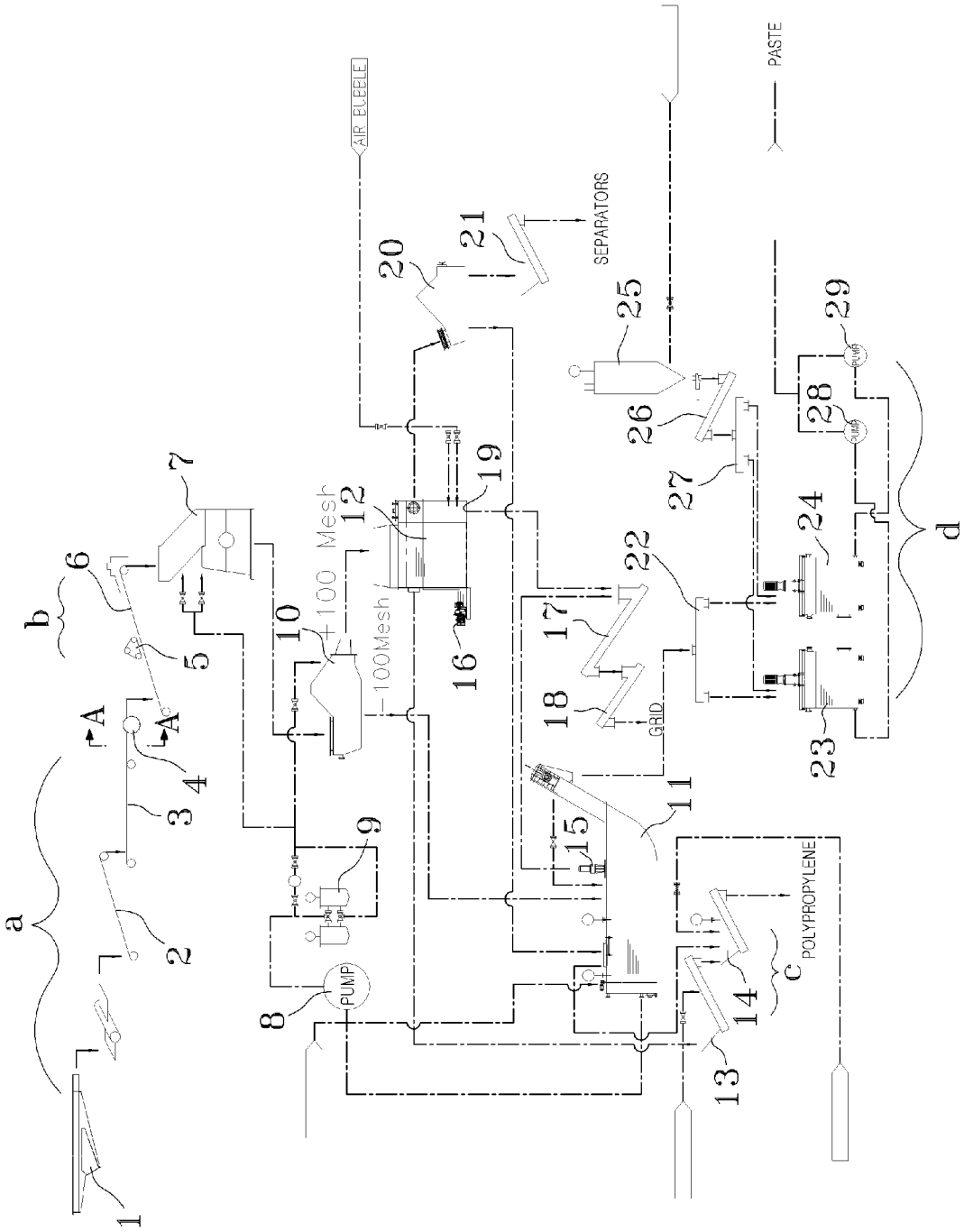
thereto from the first forward and backward screw conveyer and the second forward and backward screw conveyer; and

second and third pumps for pumping a desulfurized reactant from the first and second agitators and supplying it to a filter press.

[Fig. 1]



[Fig. 2]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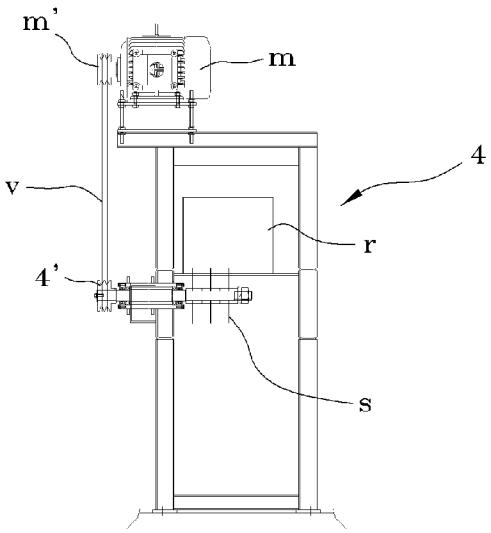
[Fig. 3]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/003389

A. CLASSIFICATION OF SUBJECT MATTER

B09B 5/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8: B09B, B02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility Models and applications for Utility Models since 1975

Japanese Utility Models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) "scrapped battery", "recycling system", "crushing", "sorting", "separating", and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR100356180 B1 (Pohang Research Institute of Industrial Science & Technology) 18 OCTOBER 2002 See abstract and claim (1)	1-8
A	KR100285285 B1 (Pohang Pesearch Institute of Industrial Science & Technology) 02 MAY 2001 See claim (1)	1-8
A	JP11077011 A (Mitsui Mining & Smelting Co. Ltd.) 23 MARCH 1999 See claim (1)	1-8

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 DECEMBER 2007 (11.12.2007)	**11 DECEMBER 2007 (11.12.2007)**

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/003389

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR100356180 B1	18.10.2002	NONE	
KR100285285 B1	02.05.2001	NONE	
JP11077011 A	23.03.1999	NONE	